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Vaping Among Adolescents

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Abstract

The use of electronic cigarettes has escalated over the past years, among adolescents and young adults, exposing consumers to harmful chemicals. In this capstone paper, I review the current literature on electronic cigarettes asking the questions: What is vaping? Why should we be concerned about vaping among teenagers? Finally, I report on findings of a survey of teenage knowledge about vaping at a local South County highschool and examine options for better-educating youth about vaping.

Vaping Among Adolescents

As time goes, new trends emerge. Vaping is one of these trends that has become a new social epidemic in today's society. Adolescents' use of electronic cigarettes and other aerosols has expanded significantly over the past few years. Electronic vaporizers are electronic cigarettes (e-cigarettes) that are battery-powered devices. These devices were originally made to vaporize nicotine or denicotinized solutions via an inhalation-activated heating element (Morean, Kong, Camenga, Cavallo, & Krishnan-Sarin, 2015). According to Patrick, Miech, Carlier, O'Malley, Johnson, and Schulenberg (2016), the use of vaping has expanded nine-fold between U.S. high school students and six-fold between middle school students among 2011 to 2014. Vaping not only affects young adults but adolescents as well. The use of vaping is a social health matter due to its negative impact on teens' health (Patrick, Miech, Carlier, O'Malley, Johnson, & Schulenberg, 2016). Consumers and parents should be alert of the health exposure that vaping can cause to their bodies. For that reason, it is time to inform teens and parents about the unexposed health exposure of vaping. Given the concern about e-cigarettes and vaping in South County, I conducted a small study that looked at students' perspectives on what they know about e-cigarettes and vaping. I collaborated with my classmate who had worked with a local principal to distribute surveys to five classrooms in a high school. This capstone paper presents my findings and concern for the Spanish speaking community which may not have access to the same health information.

Literature Review

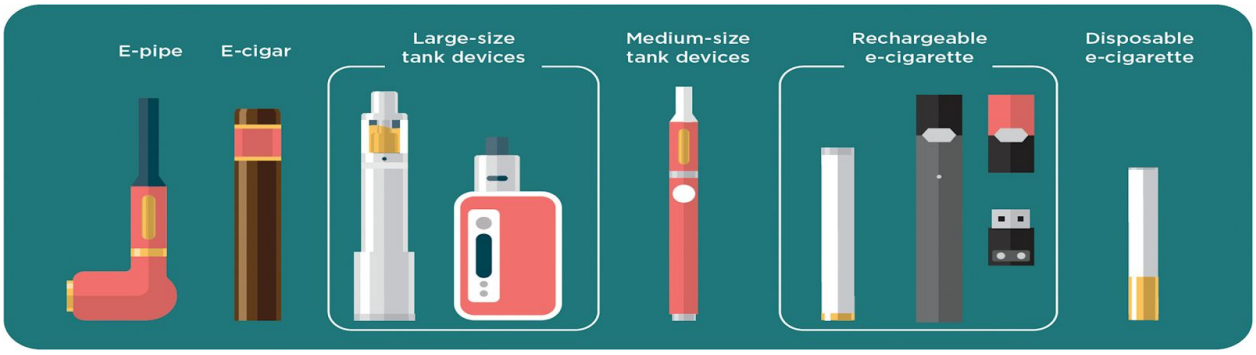
In order to add to my purview of e-cigarettes, vaping, and the health risks that can affect consumers, I began my analysis on published work that centralized on e-cigarettes and vaping among adolescents. During my analysis, I came to realize that the use of vaping between adolescents has expanded significantly over the past years.

The History of E-Cigarettes

According to Douglass and Solecki (2017), the first e-cigarette was formed in 1965 by Herbert Gilbert. Those e-cigarettes were introduced to the public as a safe and nontoxic alternative to smoking cigarettes. Later, in 2003, an electronic design was then personalized in China by Ruyan Technology. It was displayed to the United States in 2007, as a healthier substitute to smoking ordinary cigarettes (Douglass & Solecki, 2017). After Ruyan's first-generation of e-cigarettes, new visuals and different brands have developed in many different designs and flavors (Douglass & Solecki, 2017).

The Many Different Types of Gadgets for Vaping

Vaping consists of e-cigarettes that come in many designs and sizes which are also known as electronic nicotine distribution systems. Some of the designs consist of e-cigs, e-hookahs, hookah pens, vapes, vape pens, Juuls, or mods (Selekman, 2019). Figure1 below presents the vaping instruments including E-pipes, e-cigar, large-size tank devices, medium-size tank devices, rechargeable e-cigarette, and disposable e-cigarette.



Source: drugabuse.gov

FIGURE 1

According to Douglass and Solecki (2017), in 2014, there were about 466 brands available for consumers and 7,764 distinctive flavors of e-cigarettes. The most popular being "Juul".

Selekaman (2019) also reports that regardless of the model, most e-cigarettes have four different parts (see Figure 2) These include: a reservoir or cartridge that holds the liquid solution that contains nicotine, flavorings, and other chemicals; a mouthpiece that is used to inhale the liquid solution; an atomizer; and a power source which is typically the battery of the device. These models are battery-powered devices that allow users to inhale aerosolized

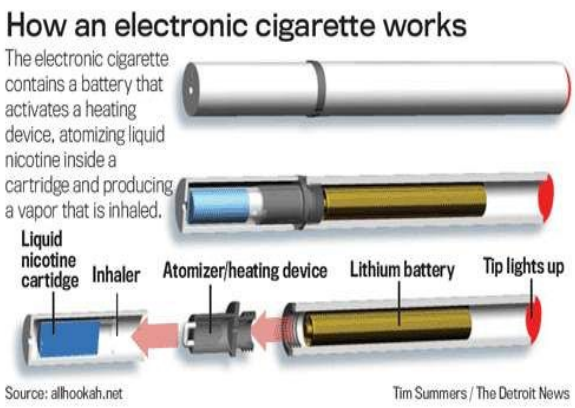


Figure 2

liquid (Tobore, 2019). E-cigarettes typically consist of nicotine because the liquid contained in the cartridge is created by extracting nicotine from tobacco that is blended with a base, colorings,

flavorings, and other chemicals that might be also added (Selekaman, 2019). These contents can be highly addictive and harmful to humans.

Why is this Information Important?

Electronic Cigarettes (e-cigarette) and other vaping devices are becoming more and more popular between middle and high school-aged students in the U.S (Borodovky, Lee, Crosier, Gabrielli, Sargent, & Budney, 2017). Moreover, these devices have also become a way of delivering recreational drugs to adolescents without knowing the risks that can emerge (Gregoire, 2019). Among e-cigarettes, there is also cannabis vaping which seems to be more popular, among high school-aged youth than adults (Morean, Kong, Camenga, & Krishnan-Sarin, 2015). According to Gregoire (2019), "the US Centers for Disease Control and Prevention reported on a new severe pulmonary disease that appears to be related to vaping" (p.3). Around 500 cases have been reported. These vary in severity from pulmonary disease to death. While Gregorie (2019) reported that there were approximately six confirmed deaths, these continue to increase. Furthermore, the 500 cases reported are young males, of whom 80% of them have vaped tetrahydrocannabinol, which is a crystalline compound that is the main active ingredient of cannabis (Gregory, 2019).

The Impact of Nicotine in E-Cigarettes

The younger the consumer, the more likely he or she will become addicted to vaping. Electronic cigarettes transmit as many as 10 toxic chemicals, nicotine being the most dangerous. Nicotine is an extremely addictive item that is commonly vaped. Some other health effects due to nicotine are that nicotine can cause users to have high blood pressure. For example, an increase

in heart rate and blood pressure; vasoconstriction of arteries and vessels, endothelial dysfunction, and atherosclerosis acceleration (Douglass & Solecki, 2017). This means that nicotine impacts the health and function of the heart and veins which carry blood throughout the body. As for adolescence, nicotine can result in addiction since the brain is still developing. Furthermore, harmful consequences can result: such as behavioral and cognitive impairments, memory issues, inattention, and executive function impairments (Douglass & Solecki, 2017).

While vaping is advertised as a healthier choice than smoking tobacco because they do not contain tar and carbon monoxide; however, the amount of nicotine in an e-cigarette is often higher (Selekman, 2019). Selekman also states that each pod consists of 40 mg to 59 mg of nicotine, which is about the same amount as in an entire pack of cigarettes. One pod provides about 200 puffs of a cigarette to consumers (2019). Thus the greater nicotine levels put adolescents at greater risk of becoming addicted.

Juul Pods

JUUL was marketed in 2015 and it quickly took over its competitors to become the top-selling electronic cigarette in the United States. Juul was developed by two former smokers. Its mission is to improve the lives of 1 billion adult smokers by eliminating cigarettes. A way that this company encourages the switch from cigarettes to Juul is with its "Juul calculator". With this calculator, people can estimate how much money they will save if they use Juul instead of regular cigarettes. While consumers may be saving money, they are being exposed to much more nicotine. According to a Monterey County Herald report (Perrone, 2019), one vape pod from Juul is equal to the nicotine in 20 cigarettes. According to Perrone (2019), today the Juul

company controls nearly three-quarters of the $3.7 billion-dollar retail market for e-cigarettes and is replicating dozens of mime brands. Perrone (2019), also states that Juul sells two formulas, a strong and weaker formula, their flavor pods. “One contains 59 milligrams of nicotine per milliliter of liquid, roughly three times what can be sold to consumers in Europe, where Juul sells a 20-milligram version of its pods and Juul’s lower-nicotine in the U.S version contains 35 milligrams of nicotine per milliliter, exceeding the European limit” (p.16). In other words, both the stronger and lower-nicotine versions sold in the U.S. are higher in nicotine than what is allowed to be sold in Europe; therefore, addicting the U.S. population at a much higher rate. The likelihood of youth consumption is even more alarming, as youth are likely to easily fall victim to this addiction.

The Side Effects that Vaping Can Cause

A major concern with regard to the side effects is the impact on young adolescent brains. The many side effects that vaping can cause are more severe to the developing adolescent brain. Some of the side effects that Tobore (2019) reports include the following: poor learning, poor academic performance, increased aggressive behavior, problems with impulsive behavior, increased depression, poor sleep quality, attention deficits, impaired cognition, and suicidal ideation. Besides the negative impact of nicotine, e-cigarettes can also contain substances that can harm the body. These substances include cancer-causing chemicals and tiny particles that can reach deep into the lungs.

Reasons for Self-Report for the Use of Vaping

Knowing why teens and adolescents use electronic cigarettes can be the first step towards trying to identify strategic approaches and reverse the rise in youth electronic cigarette use. While the regulation of e-cigarette use in Europe was to provide smoking cessation, that is not the case among U.S. youth. According to research (Patrick, et al., 2016), quitting smoking does not appear to be a primary reason for the use of vaping among youth. However, curiosity, flavors, and peer influences have been identified as the top reasons for e-cigarette use in seven middle schools, high schools, and colleges. Tobore (2019) also states in his research that teens are attracted to e-cigarettes because of marketing, social media, promotional campaigns, celebrity endorsement, feature cartoons, and sexual appeal.

The manufacturers of e-cigarettes commonly add flavoring to the liquid on which the nicotine aerosol is generated, which makes it more pleasurable to consumers and enhances the appeal to first-time users, especially teenagers (Drazen, Morrissey, & Campion, 2019). As Drazen, et al. (2019) state, flavored e-cigarettes have been successful in the market industry and the rates of vaping among teenagers are increasing at an alarming rate. Studies have also shown that flavored tobacco products are often a gateway to nicotine addiction (The Mercury News, 2019). According to The Mercury News (Mar 2019), the brand Juul has recently stopped in-store sales of sweet and fruity flavors that mimic drinks and candies that are very popular among adolescents. These flavors include bubble gum, mango, and strawberry. Juul however, still offers many popular flavors like mint (The Mercury News, Mar 2019).

How Common is Vaping in Monterey County?

Given that this project is being conducted in Monterey County, I made a search of vape and e-cigarette stores. A Map of Monterey/Seaside/Marina and then in Salinas Valley is featured in (FIGURE 4) below, showing the number of vape stores. The Monterey County Sheriff's Office and Central Coast schools are trying to reduce illegal tobacco

(Figure 4 - source google maps)

and vaping product sales among minors. Despite the progress against tobacco sales to minors, retailers continue to violate state and federal laws by supplying adolescents smokers with tobacco products (Levinson, 2018). According to the deputy in charge of tobacco operations in the country, around 30 to 40% of retailers in Monterey County are selling tobacco and vaping products to minors (KION News Team, 2019). KION News Team also states that out of the 13 stores in Seaside, two of them had clerks sell tobacco products to minors. Rubin (2014), also discusses that in Monterey County, many stores near schools are selling candies that look like tobacco products and tobacco products that look like candy. These add to the lure of tobacco.

In sum, this review of the literature has established that E-cigarettes have become very popular among both youth and young adults. Not only are there many different gadgets for consuming, but drugs are often added to e-cigarettes. Moreover, e-cigarettes are highly addictive

and those produced in the U.S. have much more nicotine than cigarettes. While research on the health impact is only beginning to be understood, its impact on lung disease is particularly alarming.

Methods and Procedures

Given the concern about e-cigarettes and vaping in South County, I collaborated with my classmate who had worked with a local principal who issued an informational survey we had designed for the students. Our data was collected from five classes at a high school. Partnering with the Principal, we were interested in students' knowledge of vaping in order to identify approaches to prevent vaping among youth.

Participants

This study observed the responses of high school students at a rural high school located in California. In 2017, the school in which this study was conducted had a total of 1,506 cumulative enrolled students; 1,420 Hispanics students, 48 White students, 12 Black students, 15 Filipino students, and 11 Asian students, (EdData) The participants for this study were 48 percent female and 49 percent male students. There were a total of 155 respondents.

Design

To address the question of how much knowledge do adolescents in this rural high school have about vaping and the health risks, we conducted a mixed-methods study of adolescents. My

classmate and I created a survey that was distributed by the school to 155 students. The survey was made up of questions that were based on the findings of our literature review. These questions were made to assess the understanding of high school students about e-cigarettes and vaping in order to determine in what areas do they need to build their knowledge.

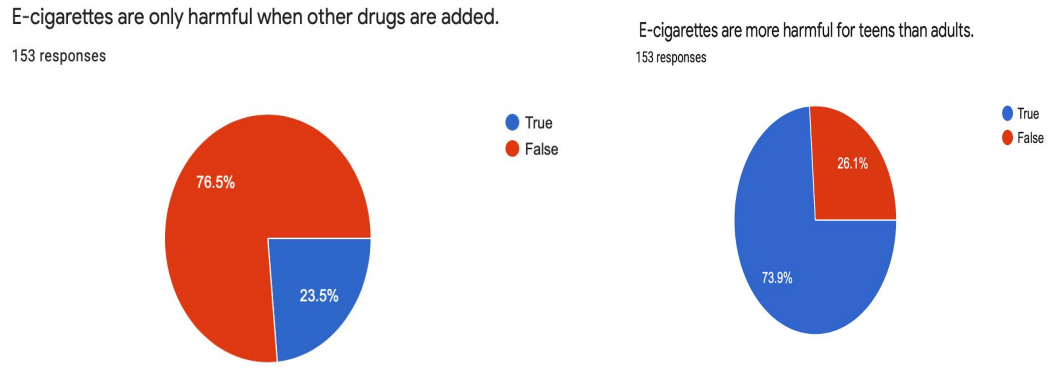
A questionnaire was given to the participants through a hard copy from their instructor approved by the Vice-Principal. There were 17 questions, ranging from true/false, and short answer questions. After conducting the surveys, we were able to thoroughly analyze the information provided in order to generate ideas regarding actions that could be taken to help reduce the usage of e-cigarettes and vaping among adolescents in Monterey County. See **Appendix A** for the questionnaire.

Data Analysis

After the questionnaire was done, I was able to analyze the data retrieved from the students who participated in this research to be able to discover what students who participated in the study understood from the answers given by the participants. By doing so, I was able to develop emerging themes. I was then able to provide recommendations in regard to help prevent the usage of e-cigarettes and vaping among adolescents.

Findings

Graph 1



The study found that adolescents need more education about the potential risks that vaping can cause. The participants seem to have some education about vaping. However, there is room for more education. For example, Graph 1 states that 23.5% of the participants believe that e-cigarettes are only harmful when other drugs are added and 26.1% of the participants also do not believe that e-cigarettes are more harmful to teens than adults. In other words, a quarter of the students surveyed are misinformed on these points. This information is important to be able to focus on what the students know and to address what they do not know. The study also states that based on an analysis of the data that was gathered and the relevant literature research three emerging themes that can be beneficial to Monterey County.

Table 1

Evaluation of Action Options

	Time	Reach	Possibility of Impact
School administrators and parents should work together. (Provide workshops for students)	High	Medium	High
In order to prevent retailers from selling tobacco to minors. Monterey County should have frequent compliance checks	Low	Low	Low
Download tools such as apps should be translated into Spanish	Medium	High	Medium

Providing Workshops

Schools administrators and the members of the community should provide adolescents and parents with workshops with important information about vaping. Vaping is on the rise among Monterey County's youth due to many reasons. One is that they can be discreet. Around 84.4% of the students agree that e-cigarettes are easy to hide from their parents and teachers. The reason why e-cigarettes can be easy to hide from parents is due to the design and the smell

of e-cigarettes. The many different flavors of pods and cartridges sold can be odorless. These products can smell nothing like tobacco and easily fool anyone because their pods and cartridges are sold in fruity and candy flavors such as mint, watermelon, cotton candy, and peach. This can be a reason why teens are tempted to vape, due to the different flavors of advertisements attracting the youth to try.

If parents and adolescents are aware of what vaping does to their bodies and their health they might have a reason to stop vaping or a reason to not think about trying to vape. In the questionnaire, we asked the students if they know anyone who uses e-cigarettes or vapes and if they have ever used e-cigarettes or vaped. The data collected states that 59% of the students do know someone who has vaped and 27.3% of the responders who are high school students have used e-cigarettes or vaped and 4.5% have thought about it. By providing students with workshops about e-cigarettes, students can better educate themselves about the vaping illness and the potential to become addicted.

Frequent Compliance Checks

The study shows that adolescents have had access to e-cigarettes even though it is against the law. As members of the community, we have to figure out how adolescents have access to e-cigarettes and any other tobacco products. In the United States and in Monterey County, retailers should not sell tobacco products to customers who are younger than 18 years. Furthermore, this study suggests that given the prevalence of vaping among youth, clerks might be violating the law because the adolescents who participated in the study are either 15, 16, 17, or 18 years old. Out of the 155 responders, 27.3% have stated that they have used an e-cigarette. To be able to help reduce the number of adolescents who are vaping, Monterey County should

have frequent monitors of retailer compliance. By using federally defined “annual, random unannounced inspections” (compliance checks) at which supervised minors try to buy e-cigarettes or any tobacco products, we are able to find clerks who might be violating the federal law (Levinson, 2018). The issue can either be that government-issued photo identification is not being requested when purchasing these items or retailers just violate state and federal law by supplying adolescents with tobacco. For that reason, frequent compliance checks can be a great strategy to help reduce the number of adolescent consumers.

Download Tools Translated

After finishing with my literature review, I then decided to gather more information by reviewing two typical social media sites for a conversation about vaping and health. Instagram is a social media app that allows users to share edit photos and videos in a creative way with friends and family members. TikTok is a social media app that is destined for short-form videos.

On Instagram, the most popular hashtags that I found under vaping with more than 5.6 million posts were #vapetricks, #vapecommunity, and #vapelife. Under these hashtags, there were many posts promoting products with different flavors like bluefish gummy eliquid, smores, and many other fruity flavors aimed at youth.

Under the TikTok app, the hashtag #vapetricks has more than 328.3 million views. Some of the videos under that hashtag are videos of people vaping and showing their viewers’ tricks that they can do while vaping. However, there are also videos trying to prevent viewers from vaping by educating them about the vaping illness. For example, I came across a medical professional who is using the app to try to prevent teens from using e-cigarettes by explaining the many different health risks vaping can cause. Dr. Rose Marie Leslie, a Family Medicine

Specialist in Minneapolis, Minnesota is using her platform to educate teens about vaping. Her most popular TikTok videos are focused on the current vaping epidemic. Her vaping videos are about informing the audience about the latest illness that vaping can cause. According to Dr. Leslie, the respiratory illness is related to vitamin E- Acetate, which can be safe to eat but not safe to inhale. She also has a video comparing an X-ray of the lung of a person who has used e-cigarettes to a normal chest X-ray and a video of how the deadly vaping lung illness looks under a microscope. This review of youth habits illustrates the problem of vaping.

While Dr. Leslie's efforts are great, they are geared towards an English speaking audience. This means that this information is only beneficial to the English speaking audience, leaving behind the Spanish speaking audience. Coming from a Hispanic culture, I believe that this information can be beneficial to educate Hispanic parents about the risks of vaping. If parents are well educated about e-cigarettes, they are able to parent their children to be safe and responsible by staying away from e-cigarettes. Parents are the ones that form the mentality of their children as well as they are the ones who shape their future into the right path by implementing the right approaches to their children. A great approach that Hispanics use is verbal education. Verbal education focuses on parents approaching their child's safety by using communication skills with their children. If parents have great communication skills with their children, parents are able to help their children stay away from e-cigarettes and any other tobacco products.

Discussion

Based on the results, participants do have knowledge of e-cigarettes and vaping. This study has shown that teens do seem to be aware that vaping can be harmful to their health because e-cigarettes contain harmful and addictive chemicals like nicotine. However, I found it surprising that teens that participated have vaped or thought about vaping even though they are aware that it can be harmful to their health. While students can be easily influenced by their peers to try new trends, teens should first be aware that the chemicals that e-cigarettes contain are harmful especially to adolescents. As the literature has shown, e-cigarettes contain toxic chemicals that can harm their brain development and damage their lungs. It is time that the community gets together to solve this epidemic among adolescents.

Limitations

Due to the current circumstances of COVID-19, I was not able to present the information I have gathered to any local high schools around my community. I also believe that after analyzing this study, the small number of participants may impact the outcome of the study. A study with a larger number of students from different communities would have increased the quality of different responses. Another limitation was that I was not able to interview parents in regards to vaping, due to COVID-19. Perhaps, if I had the opportunity maybe I could have found some findings in regard to why they believe their children are vaping if they are.

Conclusion

Electronic cigarettes are an important topic that everyone should be aware of. The research has indicated that electronic cigarettes among youth have become an epidemic problem in the United States. If adolescents continue to have easy availability to these products they are only going to harm their health or possibly lead to their death.

Overall, for that reason, I believe that this research paper can be used by administrators, parents, and teens as a reference to be informed and understand the epidemic among teens and vaping. Moreover, I also believe that this research project has fulfilled the learning outcomes of the Liberal Studies major. This study paper was based on the MLO3: Innovative Technology Practitioner and MLO4: Social Justice Collaborator. The research satisfied MLO3, Innovative Technology Practitioner by encouraging me and recommending it to parents, students, and school administrators to use technology as a way to be educated about e-cigarettes. The second MLO on this project fulfilled Social Justice Collaborator. As discussed in this paper, vaping among teens has become an alarming issue due to electronic cigarettes containing many harmful chemicals that are highly addictive to adolescents. As future educators and anyone who is interested in the education system, they are able to use this project as a way to learn some knowledge about electronic-cigarettes and how they impact teens among our community. If my colleagues, parents, school administrators, and students are educated about vaping then we can all work together to stop this community problem. Moreover, the results of this study provide the answers to these important questions: What is vaping? What are the different types of gadgets for vaping? And what are the health risks of vaping? In order for this epidemic to end, companies need to stop advertising their products to adolescents by not selling fruity or candy flavors of pods and cartridges.

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Appendix A

LS 400, Capstone Survey Question

1. What is your age?
   a. 15 b. 16 c. 17 d. 18
2. What gender do you identify as?
   a. Male b.Female c. Other d. Uncertain
3. Do you know anyone who uses e-cigarettes or vapes?
   a. Yes b. No
4. Have you ever used e-cigarettes or vaped?
   a. Yes b. No c. I would never use it d. I have thought about it
5. True or False: Identify the health risks associated with e-cigarettes and vaping

True or False 6. E-cigarettes contain more nicotine than tobacco cigarettes.

True or False 7. E-cigarettes are more addictive than tobacco cigarettes.

True or False 8. E-cigarettes are useful in smoking cessation (They help people to STOP smoking).

True or False 9. E-cigarettes are not harmful to health.

True or False 10. E-cigarette companies care about the health of children.

True or False 11. E-cigarettes are only harmful when other drugs are added.

True or False 12. E-cigarette companies use fruit-flavors (like mango, cherry, etc.) to attract young people to buy their products.

True or False 13. E-cigarettes contribute to environmental pollution.

True or False 14. The smoke from e-cigarettes is not harmful to the smoker or bystander's health.

True or False 15. E-cigarettes are more expensive to use than tobacco cigarettes.

True or False 16. E-cigarettes are easy to hide from parents and teachers.

True or False 17. E-cigarettes are more harmful to teens than adults.